

Lane-Fox. *No flint implements have been found in Egypt in association with an extinct fauna, or in beds corresponding in geological position to the implement-bearing gravels of the Somme valley.*

2. "W. B. D." asserts that in every one of the cases cited by me (I cite one or two hundred) to prove "the ages" simultaneous, "there is no proof that the deposit has not been disturbed."

I select by way of reply five examples: the pile-village at Unter Uhldingen (Switzerland); the skeletons found at Cumaroala, in Italy; the trenches at Alise; the pile-village near Lubtow, in Pomerania; and the relic-beds at Hissarlik.

3. Solutré is a crucial case. Referring to this, "W. B. D." disposes of it by remarking that a Merovingian cemetery was planted here on a palæolithic station, "as he was informed by Dr. Broca at the French Association at Lyons in 1873." "In this case," he proceeds, "which is made the basis of the attack on the high antiquity of palæolithic men, the human skulls are comparatively modern, and the refuse heap of an untold age."

This statement implies both ignorance and a treacherous memory on the part of "W. B. D."

We are all aware that there are Merovingian remains at Solutré. There are also Roman or Gallo-Roman remains. But the argument from Solutré is this: (1) That the bones of the extinct animals found in association with the flint implements have preserved a portion of their gelatine, and that the horns of the reindeer, when cut, yield the odour of fresh horn. (2) That the flint implements found, though unpolished, are of very superior and advanced workmanship, hardly inferior to the beautiful specimens from Denmark. (3) That there are found here the remains of some 40,000 horses, and that the horse was probably domesticated. (4) That there are numerous instruments here of palæolithic date, some of them in carefully closed stone cists or boxes. The remark of "W. B. D." about the Merovingian graves has therefore no application except in connection with (3) and (4); as regards (3), the *horse-deposit*, as it is called (outside of the refuse-heaps), some of which was compacted into a solidified mass—contained the flint implements and the bones of the mammoth, reindeer, &c.; and, in addition, *extended beneath* the most ancient fire-places, or hearths, containing the palæolithic skeletons and the flints and the bones of the reindeer and mammoth. The horse-remains are not, therefore, Merovingian. As regards (4), and the assertion, on the authority of Dr. Broca, that the graves are Merovingian; this whole subject came up at the French Association at Lyons in 1873; the Association *visited* Solutré; and by way of reply to what "W. B. D." says he gathered from Dr. Broca, I quote from the report of the Proceedings of the Association in "Matériaux pour l'Histoire de l'Homme," 7^e, 8^e, and 9^e Livraisons, 1873, pp. 324, 325, 342. When M. Cartailhac observed that "the discussion was of the greatest gravity, and would remain celebrated in the history of anthropological science," and that although there may have been some disturbances of the soil, "one thing remained certain, viz., that in more than ten instances, a human skeleton had been found on a quaternary fire-place, and not one fact exists to be opposed to the admission of their contemporaneity"—when M. Cartailhac had expressed himself to this effect, the report proceeds:—

"M. Broca partage cette opinion et déclare ouverte la discussion sur le deuxième problème: *les chevaux.*"

Subsequently, participating further in the discussion (p. 342), M. Broca stated that he had examined twenty-five skulls from Solutré, and that of this number seventeen belonged to the epoch of the reindeer—"à la véritable époque paléolithique solutréenne."

I leave "W. B. D." to reconcile these declarations of Dr. Broca made in the public meeting with the private declarations made to him. "W. B. D." closes with the remark that "he has not been able to find [in the book] a single shred of proof of the recent origin of man."

I show that the lake-dwellings in France come down to the eighth century of our era; in Pomerania and Sweden to the eleventh century. I show that great changes of level have occurred in different parts of the earth within a comparatively recent period, as at Uddenalla and Södutalje in Sweden, and in the island of Mön.

I show that in America the remains of the mastodon and mammoth occur in the most superficial deposits—the food sometimes preserved in the stomach; I refer to the preservation of the Mammoth in Siberia; I show that the reindeer and Great Irish Elk lived in Europe down to the Middle Ages; that the

Cave-bear survived to Neolithic times, &c. I show that the hippopotamus is figured in the Trojan bed at Hissarlik; that the lion was found in Europe three centuries before our era; that the rhinoceros is found in the neolithic caverns of Gibraltar; that the elephant was brought to Shalmaneser II. by the *Muari* in the eighth century B.C. I might have added that the elephant lived in Mauritania (near the Straits of Gibraltar) in the time of Herodotus and Pliny.

I point out that, owing to the continuance of the ice-sheet, palæolithic man never penetrated into Scotland or Denmark; but that the human period there commences with the Neolithic age, which, interpreted, means that the *Glacial epoch* in that region lasted down to the date of the older lake-dwellings.¹

JAMES C. SOUTHALL

Richmond, Virginia, U.S., March 20

"The Unseen Universe"

In Art. 213 the distinguished authors of "The Unseen Universe" say: "We have already shown (Art. 164) that development without life, that is dead development, does not tend to produce uniformity of structure in the products which it gives rise to."

In the article referred to they say: "There is one peculiarity of the process of development now described which we beg our readers to note. We have supposed the visible universe, after its production, to have been left to its own laws, that is to say, to certain inorganic agencies, which we call forces, in virtue of which its development took place. At the very first there may have been only one kind of primordial atom; or, to use another expression, perfect simplicity of material.

"As, however, the various atoms approached each other in virtue of the forces with which they were endowed, other and more complicated structures took the place of the perfectly simple primordial stuff. Various molecules were produced at various temperatures, and these ultimately came together to produce globes or worlds, some of them comparatively small, others very large. Thus the progress is from the regular to the irregular." Is not this a *non sequitur*? "And we find a similar progress when we consider the inorganic development of our own world. The action of water rounds pebbles, but it rounds them irregularly; it produces soil, but the soil is irregular in the size of its grains, and variable in constitution. Wherever what may be termed the brute forces of nature are left to themselves, this is always the result; not so, however, where organisms are concerned in the development.

"Two living things in the same family are more like each other than two grains of sand or two particles of soil. The eggs of birds of the same family, the similar feathers of similar birds, the ants from the same ant-hill, have all a very strong likeness to each other." It seems to me that the argument here tends to show that the planetary or world development, and what the authors term living development, are based on the same primordial law. If development without life does not tend to produce uniformity of structure in the products it gives rise to, and development with life does tend to the opposite result it would logically follow that the worlds with which we are acquainted are the result of living development.

No two living things of the same family are more alike than are the planets of our solar system; alike in form, alike in their motions, and alike in the material of which they are made; and if the doctrine of their growth, maturity, and final dissolution, which the nebular hypothesis ascribes to them, be a verity, then alike in these respects to living development on the earth. I have long been of the opinion that the same principle underlies all development from the smallest microscopic insect to the largest world in the universe, and I am gratified to find two such profound philosophers as Professors Stewart and Tait virtually advancing the same theory. It may, however, be said that they do not admit this sequence. They suppose the visible universe, after its production, to have been left to its own laws, to certain inorganic agencies or forces in virtue of which its developments took place, that at first there may have been only one kind of primordial atom from which all present development has arisen. This is mere speculation; but admitting its verity, it does not alter the truths enunciated by them that dead development does not tend to produce similarity of structure, that the results of the brute forces of nature left to themselves are accidental forms, and that where there is uniformity of structure there is living development.

¹ Certainly not 10,000 years ago; in my opinion not 3,500.

In a careful examination, however, of the whole argument of the authors of the "Unseen Universe," it looks to me as though they saw clearly to what their course of reasoning, as far as this particular point is concerned, tended, but were willing to stop short of the true logical result, believing that humanity was not yet prepared to admit that we are only a small part of one stupendous whole, a universe of individual life.

Of the main object and scope of their argument I have nothing to say, only this: if the premises assumed—and they are the assumptions of the modern school of science—are correct, there is nothing unreasonable in the conclusions at which the authors have arrived.

NOTE.—Since writing the above I have seen the authors' preface to the second edition of the "Unseen Universe," in which they say: "To reduce matters to order, we may confidently assert that the only reasonable and defensive alternative to our hypothesis (or, at least, something similar to it) is the stupendous pair of assumptions that visible matter is *eternal*, and that it is *ALIVE*. If anyone can be found to uphold notions like these (from a scientific point of view), we shall be happy to enter the lists with him." If the distinguished authors will confine themselves to this proposition, that "All visible aggregations of matter, such as our earth and its congeners, are living organisations, in other words, *ARE ALIVE*," I think the affirmative can be successfully maintained.

Whether matter is eternal and each individual particle or atom of matter is alive, is too far in the interior of the unknown to be discussed with any possibility of successful results, and, too, the idea of an atom being a living organisation is directly opposed to the whole theory of atomicity, and scientifically ludicrous in view of that theory.

JOSIAH EMERY

City of Williamsport, Pa., U.S., March 10

Prof. Tait on the Earth's Age

It is well known that Sir W. Thomson has concluded, from different lines of argument, that the age of the earth, as a body cool enough for habitation, cannot be much greater than a hundred million years.

Prof. Tait, in his "Recent Advances in Physical Science," recapitulates these arguments, but with a different conclusion. He states the limit of age to be about ten million years.

As the subject is of immense interest, may I ask Prof. Tait to explain this change of conclusion?

J. D. EVERETT

A Relapsed Donkey

SOME years ago on one of the Lucknow roads I met a "Dhobi" (washerman) with some donkeys. I send you a picture of one of them, made by a native artist. It shows, I think, the relationship between the zebra and the donkey better than many which I have seen. Mules and horses often show zebra marks on their legs, but I have never before or since seen the marks so well displayed on the trunk and legs as in this donkey. The stripes on the body are blended together at their base, and so are the stripes on the legs blended into bands. At the time I endeavoured to find out whether in the days of the kings of Oudh there had been any zebra in Lucknow which might have bred with donkeys, but could find nothing about it. Had there been a zebra which bred with donkeys, I think there would have been more of these striped animals; but this is the only one I have seen since 1858. I think it a case of simple *atavism*. Perhaps you may think it worthy of a record in NATURE. All "Dholis" donkeys are small, wretched creatures, mostly with crooked legs.

E. BONAVIA

Lucknow, Feb. 29

OUR ASTRONOMICAL COLUMN

VARIABLE STARS.—Mr. J. E. Gore, M.R.I.A., of Umballa, Punjab, calls attention to a star of the sixth magnitude entered in Harding's Atlas, between ϵ Leporis and B.A.C. 1553, and which is underlined. Mr. Gore says: "In February of this year, with a 3-inch refractor, I found Harding's 6 m. star a little brighter than the 9 m. star south of it, but less than several 8 m. stars (Harding) following. It has a small companion δ at about $1' \pm$. Harding's 9 m. stars seem about 10 m." Reading off from the Atlas the position of the sixth magnitude for 1800

appears to have been about R.A. $73^\circ 32' 5''$, N.P.D. $111^\circ 25'$, whence for 1876 o we have R.A. 4h. 57m. 25s., N.P.D. $111^\circ 18'$. This star does not occur in Argelander's Zones, nor in the Washington Zones in the volumes of observations for 1870 and 1871.

Gilliss has this note to No. 543 of his Catalogue of 1248 stars for 1840 (B.A.C. 3815): "Probably variable at very short intervals. Of the seven observations three estimations make it 6th magnitude, three 5th, and the other 5.6." This star, which was observed by Flamsteed, Bradley, Piazzi, and Taylor, was also observed by Argelander on three nights, viz., 1850, March 15, 1851, April 22 and 28, the magnitudes being noted on these occasions, 5, 7, 6 respectively. It appears not unlikely that if this star is examined at short intervals Gilliss's suspicion of variability will be confirmed. It is situate in Hydra R.A. (1876), 11h. 2m. 45s., N.P.D. $117^\circ 25'$.

As perhaps connected with the subject of variable stars, we may refer to a remark by Piazzi, applying to his star XVI. 35. He says: "Fortiter nuncans, intereadem, sequens tranquilla luce splendescit." No. 35 is called 8 m., and the star following 15", and south 18", which did not exhibit the strong scintillation of its neighbour, 6 m. Both stars occur in the Washington Zone, 1847, June 17, magnitudes 7.8 and 6.7. Also to the remark attached by Lalande to the star of 8.9 mag. observed on the middle wire at 20h. 35m. 39.5s., 1796, August 23, "Beaucoup de scintillation" ("Histoire Céleste," p. 242); this star is No. 40102 Cygnus, of the reduced catalogue, R.A. (1876), 20h. 39m. 23s. N.P.D. $58^\circ 45' 2''$. Several of the variable stars are well known to exhibit striking scintillation at times, and perhaps more especially when on the point of diminution; this has been particularly the case with S. Virginis (Hind, 1851), in which redish-yellow star flashes of a deeper red are occasionally present, producing an impression of unusual scintillation.

The star Lalande 34746 Aquila is of a deep orange colour. Its position is erroneously given in the reduced catalogue from the observation 1796, June 25; the N.P.D. should be $96^\circ 43' 28'' 7$. It does not occur in the Zones of Bessel or Santini. Lalande calls it 7m., and it is entered of the same magnitude in the charts of Capocci and Inghirami. In September, 1873, it was 7.8, so that at present a claim to be included in the list of variables is not quite made out; still as so large a proportion of the highly-coloured stars do prove to be variable, L. 34746 may be worth watching. Position for 1876 o. R.A., 18h. 38m. 25s., N.P.D., $96^\circ 39' 5''$.

Several of the variable stars to which attention has been called in this column during the last twelvemonth, are now in favourable positions for observation.

THE SEARCH FOR COMETS.—No new telescopic comet has been detected since that found by M. Borrelly at Marseilles early in December 1874, an interval of more than sixteen months. Perhaps we may attribute this circumstance partly to the very unfavourable weather which has prevailed generally during the last year, but it is pretty certain that if a systematic search for these bodies, with suitable instruments, could be instituted by aid of amateurs of the southern hemisphere, comet astronomy would be greatly the gainer. Such work is not adapted to the routine of the public observatories, nor can they afford, in the actual state of what may be termed the standard astronomy of the other hemisphere, to devote time to it; but it is an occupation especially within the province of the amateur. If his instrumental means are not equal to the determination of accurate positions, he may content himself with intimating any discovery to the astronomers in charge of the public establishments who, after receiving indication of the approximate position of any new comet, will no doubt secure observations sufficient for the calculation of the orbit. In this way it is highly probable that the number of known comets of short period may be materially increased, since it is only at certain returns